

## Claims

- 1 1. A method of generating an ultrawideband radio frequency pulse, comprising:  
2       generating a carrier signal having a selected frequency;  
3       shaping the carrier signal with a window function to produce an  
4 ultrawideband pulse.
- 1 2. The method of claim 1, wherein the window function comprises a sinusoidal  
2 function.
- 1 3. The method of claim 2, wherein the window function comprises one of a  
2 Hamming window, a Hanning window, and a Blackman window.
- 1 4. The method of claim 1, further comprising gating the shaped carrier to produce  
2 the ultrawideband pulse.
- 1 5. The method of claim 1, wherein the method is performed via a mixer and a  
2 CMOS radio frequency switch.
- 1 6. An ultrawideband radio frequency signal generator, comprising:  
2       a first signal generator operable to generate a sinusoidal window function;  
3       a second signal generator operable to generate a carrier signal; and  
4       a mixer operable to produce an ultrawideband radio frequency product signal  
5 as a product of the sinusoidal window function and the carrier signal.
- 1 7. The ultrawideband radio frequency signal generator of claim 6, further  
2 comprising an RF switch operable to gate the ultrawideband radio frequency output  
3 signal.

1 8. The ultrawideband radio frequency signal generator of claim 7, wherein the RF  
2 switch comprises a P-FET, a first N-FET and a second N-FET;  
3 the source of the P-FET coupled to the first voltage source, the gate of the P-  
4 FET coupled to the input voltage level, and the drain of the P-FET coupled to the  
5 drain of the first N-FET and the gate of the second N-FET;  
6 the gate of the first N-FET coupled to receive the control signal, and the  
7 source of the first N-FET coupled to the drain of the second N-FET;  
8 the source of the second N-FET coupled to the voltage reference.

1 9. The ultrawideband radio frequency signal generator of claim 6, wherein the  
2 mixer comprises a single-balanced mixer.

1 10. The ultrawideband radio frequency signal generator of claim 6, wherein the  
2 mixer comprises a double-balanced mixer.

1 11. The ultrawideband radio frequency signal generator of claim 6, wherein the  
2 mixer comprises a cascade of two or more fixed transconductance amplifiers.

1 12. An ultrawideband radio frequency data communications device, comprising:  
2 a first signal generator operable to generate a sinusoidal window function;  
3 a second signal generator operable to generate a carrier signal; and  
4 a mixer operable to produce an ultrawideband radio frequency product signal  
5 as a product of the sinusoidal window function and the carrier signal.

1 13. The ultrawideband radio frequency data communications device of claim 12,  
2 further comprising an RF switch operable to gate the ultrawideband radio frequency  
3 output signal.

1 14. The ultrawideband radio frequency data communications device of claim 13,  
2 wherein the RF switch comprises a plurality of CMOS transistors.

1 15. The ultrawideband radio frequency data communications device of claim 12,  
2 wherein the mixer comprises a single-balanced mixer.

1 16. The ultrawideband radio frequency data communications device of claim 12,  
2 wherein the mixer comprises a double-balanced mixer.

1 17. The ultrawideband radio frequency data communications device of claim 12,  
2 wherein the mixer comprises a cascade of two or more fixed transconductance  
3 amplifiers.

1 18. A method of generating an ultrawideband radio frequency signal, comprising:  
2 generating a sinusoidal carrier signal having a selected frequency;  
3 generating a sinusoidal window shaping signal having a frequency lower  
4 than that of the carrier signal;  
5 mixing the carrier signal and window shaping signal to obtain a product  
6 signal; and  
7 gating the product signal to form an ultrawideband signal such that the  
8 window shaping signal component of the product forms a sinusoidal window pulse  
9 function.

1 19. The method of claim 18, wherein the sinusoidal window pulse function  
2 comprises one of a Hamming window, a Hanning window, and a Blackman  
3 window.

1 20. The method of claim 18, wherein the gating is performed via a CMOS radio  
2 frequency switch.

1 21. An ultrawideband radio frequency signal generator, comprising:  
2 a first signal generator operable to generate a sinusoidal window function;  
3 a second signal generator operable to generate a carrier signal; and  
4 a mixer operable to produce an ultrawideband radio frequency product signal  
5 as a product of the sinusoidal window function and the carrier signal; and  
6 an RF switch operable to gate the ultrawideband radio frequency product  
7 signal, wherein the RF switch comprises at least three coupled CMOS transistors.

1 22. The ultrawideband radio frequency signal generator of claim 21, wherein the at  
2 least three coupled CMOS transistor are coupled to a first voltage source, a voltage  
3 reference of a different voltage than the first voltage source, an input voltage level, a  
4 control signal, and an output conductor.

1 23. The ultrawideband radio frequency signal generator of claim 22, comprising a  
2 P-FET, a first N-FET and a second N-FET;  
3 the source of the P-FET coupled to the first voltage source, the gate of the P-  
4 FET coupled to the input voltage level, and the drain of the P-FET coupled to the  
5 drain of the first N-FET and the gate of the second N-FET;  
6 the gate of the first N-FET coupled to receive the control signal, and the  
7 source of the first N-FET coupled to the drain of the second N-FET;  
8 the source of the second N-FET coupled to the voltage reference.

1 24. The ultrawideband radio frequency signal generator of claim 22, wherein the  
2 voltage reference comprises a ground voltage level.

1 25. An ultrawideband radio frequency data communications system, comprising:  
2 a first signal generator operable to generate a sinusoidal window function;  
3 a second signal generator operable to generate a carrier signal;

4           a mixer operable to produce an ultrawideband radio frequency product signal  
5 as a product of the sinusoidal window function and the carrier signal;  
6           a modulator that is coupled to receive a data signal from a data signal source,  
7 the modulator further coupled to modulate the ultrawideband radio frequency  
8 product with the data signal; and  
9           an antenna coupled to receive the ultrawideband radio frequency product  
10 signal and further operable to transmit the ultrawideband radio frequency product  
11 signal.

1   26. The ultrawideband radio frequency data communications system of claim 25,  
2 wherein the modulator is coupled to the carrier signal produced by the second signal  
3 generator, thereby operable to modulate the ultrawideband radio frequency product  
4 with the data signal by modulating the carrier signal.

1   27. The ultrawideband radio frequency data communications system of claim 25,  
2 wherein the modulator is coupled to the ultrawideband radio frequency product  
3 signal output from the mixer, thereby operable to modulate the ultrawideband radio  
4 frequency product signal with the data signal.

1   28. The ultrawideband radio frequency data communications system of claim 25,  
2 further comprising an RF switch coupled between the mixer and the antenna,  
3 thereby operable to gate the ultrawideband radio frequency product signal with the  
4 data signal.

1   29. The ultrawideband radio frequency data communications system of claim 28,  
2 wherein the mixer is coupled to the RF switch, thereby operable to modulate the  
3 ultrawideband radio frequency product signal with the data signal.